

961. When the tube was arranged, as in fig. 72. with water or dilute acid on one side only, and the wires were immersed not more than one-third of an inch, the effects were greatly diminished; and more especially if, by a little motion with a platinum wire, the acids had been mixed at m , so that the transition from weak to strong was gradual instead of sudden. In such cases, even when the wires were moved, horizontally, in the acid, the effect was so small as to be scarcely sensible, and not likely to be confounded with the chemical effects to be described hereafter. Still more surely to avoid such interference, an acid moderately diluted was used instead of water. The precaution was taken of emptying, washing, and rearranging the tubes with fresh acid after each experiment, lest any of the metal dissolved in one experiment should interfere with the results of the next.

962. I occasionally used the tube with dilute acid on one side only, fig. 72, and sometimes that with dilute acid on both sides, fig. 73. I will call the first No. 1, and the second No. 2.

963. In illustration of the general results I will describe a particular case. Employing tube No. 1 with strong and dilute nitric acid,¹ and two Copper wires, the wire in the dilute acid was powerfully positive to the one in the strong acid at the first moment, and continued so. By using tube No. 2, the galvanometer-needle could be held stiffly in either direction, simply by simultaneously raising one wire and depressing the other, so that the first should be in weak and the second in strong acid; the former was always the positive piece of metal.

964. On repeating the experiments with the substitution of platinum, gold, or even palladium for the copper, scarcely a sensible effect was produced (961).

965. *Strong and dilute nitric acid.*¹—The following single metals being compared with themselves in these acids, gave most powerful results of the kind just described with copper (963); silver, iron, lead, tin, cadmium, zinc. The metal in the weaker acid was positive to that in the stronger. Silver is very changeable, and after some time the current is often suddenly reversed, the metal in the strong acid

becoming
positive: this again will change back, the metal in
the weaker
acid returning to its positive state. With tin,
cadmium, and
zinc, violent action in the acid quickly supervenes and
mixes all

¹ The dilute acid consisted of three volumes of strong
nitric acid and two
volumes of water.